Abstracts

Dispersion Analysis of the Linear Vane-Type Waveguide Using the Generalized Scattering Matrix

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The dispersion characteristics for the linear vane-type waveguide are determined using the generalized scattering matrix (GSM) formed with the mode matching algorithm. This dispersion analysis technique includes determining the eigenvalues (cutoff frequencies) for the various waveguide modes that can propagate on the circuit, as well as forming a determinantal equation for a single period of the circuit from which the system normal mode dispersion characteristics are determined. The resulting GSM is easily manipulated for determining eigenvalues for single or multiple periods of a periodic circuit using either a perfect electrical conductor (PEC) or a Re-entrant boundary condition. This boundary condition formulation using the GSM provides a generalized eigenvalue technique for 2-D and 3-D structures. Similarly, the GSM is easily manipulated to yield a new analytic expression for a determinantal equation to predict the dispersion of the system normal modes for the periodic circuit. The accuracy of the GSM eigenvalue and dispersion solution techniques are limited by the frequency resolution of the simulation and the relative convergence (RC) criterion.

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